### **Programming Assignment**

Assume that you have been given the task of creating a system for a library to keep track of their books, the borrowers of the books, and the books that are currently lent out. Your first step will be to create the relations necessary for this system.

Book will need information such as a unique identifier for each book, title, author, ISBN number, date of publication, cost.

Borrower will need information such as a unique identifier for the person such as a library card number, name, address, phone number, date of membership

BooksLended will need information such as the book checked out, the date the book was checked out, when it must be returned, the borrower of the book, etc.

Librarian will need information on the librarians who can perform the check out of a book. This will include a way to identify each librarian, their name, and extension phone number.

Be sure to identify what are candidate, primary, alternate keys and the degree of each relation. It would be recommended that you document your relations in the manner used in the Sharma et al.text.

Assignment Grading Rubric

•Assignment documents the relations required for the library system and includes each of the following:

o Book

o Borrower

o BookLended

o Librarian

•Each relation must define an identifier and its data types that uniquely identifies each tuple

•The degree of each relation must be described

•Each relation must include appropriate information other than identifiers such as attributes and the data type of attributes

o The book relation includes at least title, author, ISDN number, date of publication, and cost along with the data types that are appropriate to the data

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| **BOOK RELATION** | | |
| **Attributes** | **Data Type** | **Description** |
| BookID | Numeric | This field identifies the book in the library |
| Title | Text | This field defines the title of the book |
| AuthorFirstName | Text | The field defines the author’s first name. |
| AuthorLastName | Text | The field defines the author’s last name |
| ISDN | Numeric | The field defines the International Standard Book Number of the book. |
| PublicationDate | Date | The field defines the date of publication of the book. |
| CostUSD | Numeric | The field defines the cost of the book to purchase. |

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| **BOOK PROPERTIES** | |
| Degree | 7 |
| Candidate Keys | BookID  ISBN  firstName, lastName, PublicationDate |
| Primary Key | BookID |

o The borrower relation includes at least library card #, name, address, postal code, phone number, and date of membership along with the data types that are appropriate to the data

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| **BORROWER RELATION** | | |
| **Attributes** | **Data Type** | **Description** |
| LibraryCardID | Numeric | This field identifies the borrower in the library database |
| BorrowerFirstName | Text | The field defines the borrower’s first name |
| BorrowerLastName | Text | The field defines the borrower’s last name |
| AddressStreetNumber | Numeric | The field defines the borrower’s street number portion of their address. |
| AddressHouseNumber | Numeric | The field defines the borrower’s house number portion of their address |
| PostalCode | Alphnumeric | The field defines the borrower’s postal code. |
| PhoneNumber | Numeric | The field defines the borrower’s phone number. |
| JoinedDate | Date | The field defines the when the borrower signed up for the library card. |

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| **RELATION PROPERTIES** | |
| Degree | 8 |
| Candidate Keys | LibraryCardID  firstName, lastName |
| Primary Key | LibraryCardID |

o The booklended relation includes at least borrower, check out date, return date, book id, librarian

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| **BORROWER RELATION** | | |
| **Attributes** | **Data Type** | **Description** |
| TransactionID | Numeric | This field identifies the transaction in the library database |
| BorrowerID | Numeric | The field defines the borrower’s first name |
| BookID | Numeric | The field defines the borrower’s last name |
| LibrarianID | Numeric | The field defines the borrower’s street number portion of their address. |
| CheckoutDate | Date | The field defines the date the book was checked out of the library. |
| DueDate | Date | The field defines the date the book was due to be returned. |
| ReturnDate | Date | The field defines the date the book was actually returned. |
| PaymentMethod | Text | The field defines the borrower’s method of payment eg. paypal, cash, etc. |
| OverdueFeesCharged | Numeric | The field defines the fees owed if the book is returned later in USD |

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| **RELATION PROPERTIES** | |
| Degree | 9 |
| Candidate Keys | TransactionID  BorrowerID,CheckoutDate  BookID, BorrowerID, CheckoutDate |
| Primary Key | TransactionID |
| Alternate Keys / Foreign Keys | BorrowerID, BookID, LibrarianID |

o The librarian relation includes at least librarian id, name, phone number

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| **BORROWER RELATION** | | |
| **Attributes** | **Data Type** | **Description** |
| LibrarianID | Numeric | This field identifies the librarian in the library database |
| LibrarianFirstName | Text | The field defines the librarian’s first name |
| LibrarianLastName | Text | The field defines the librarian’’s last name |
| PhoneNumber | Numeric | The field defines the librarian’s phone number. |

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| **RELATION PROPERTIES** | |
| Degree | 4 |
| Candidate Keys | LibrarianID  LibrarianFirstName, LibrarianLastName |
| Primary Key | LibrarianID |